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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/074,642 | 02/12/2002 | Christian L. Belady | 10018060-1 | 7173 |

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EXAMINER

DUONG, THO V

ART UNIT PAPER NUMBER

3743

DATE MAILED: 04/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/074,642

Applicant(s)

BELADY ET AL.

Examiner

Tho v Duong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6,9 and 19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6,9 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 6,9 and 19 remain pending in this application. Applicant is reminded to cancel claim 10 as indicated in the applicant's Remarks.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 19 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 19 recites the limitation "the object" in lines 3 and 7. There is insufficient antecedent basis for this limitation in the claim. It is not clear if "the object" is referring to "a body" as recited at line 2 or else.

Claim 19 recites the limitation "the spreader" in line 6. There is insufficient antecedent basis for this limitation in the claim. It is not clear if "the spreader" is referring to "a heat sink" as recited in line 2 or else. If it is referring to "a thermal spreader" then it is not clear if "a thermal spreader" in line 8 is an additional thermal spreader to the system or is the same as "the spreader" as recited in line 6.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chu (US 4,226,281) in view of Chu et al. (US 5,394,299). Chu (4226,281) discloses (figures 1-6) a thermal interface (10) comprising a thermal spreader (18) forming a plurality of passageways (22); a spring element (32,34,36) coupled with the spreader (18); and a plurality of thermally conductive cylindrical pins (24) for the passageways and perpendicular with the planar face of the spring element (32,34,36); each of the pins (24) having a head (25) and a shaft moving with the spring element (36); at least part of the shaft being internal to the passageway and forming a gap between the pin (24) and the gap (22), wherein the pin heads (22) collectively and macroscopically conform to an object (12,14) couple thereto to transfer heat from the object to the spreader (18) through the passageway gap formed between the spreader and each of the plurality pins (24). Chu substantially discloses all of applicant's claimed invention except for the limitation that the pin shaft and the passageways being substantially rectangular. Chu (5,394,299) discloses (figure 2 and column 6, lines 14-21) a thermal transfer interface that has a thermal spreader having a plurality of passageways (14) and pistons (18) located within the passageways wherein the shape of the passageways (14) and piston are not limited to circular but rather may be rectangular for the purpose of increasing the heat transfer surface area between the pistons and the thermal spreader. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use employ Chu's reference (5,394,299) teaching for the purpose of increasing the heat transfer surface area between the piston and the thermal spreader.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu (US 4,226,281) in view of Lamb et al. (US 5,920,457). Chu discloses (figures 1-6) a thermal interface (10) comprising a thermal spreader (18) forming a plurality of passageways (22); a spring element such as layer with a substantially planar face of sponge like material (36) coupled with the spreader (18); and a plurality of thermally conductive cylindrical pins (24) for the passageways and perpendicular with the planar face of the spring element (35); each of the pins (24) having a head (25) and a shaft moving with the spring element (36); at least part of the shaft being internal to the passageway and forming a gap between the pin (24) and the gap (22), wherein the pin heads (22) collectively and macroscopically conform to an object (12,14) couple thereto; the head (25) protruding from the face of the spring element (36) in a direction away from the spreader (18); the object comprising a plurality of semiconductor packages and dies (12). Chu does not disclose that the rubber sponge material is thermally conductive. However, Chu does not teach away from having this rubber sponge material being thermally conductive as in applicant's argument filed 2/3/2004 since the main function of the sponge material (36) is to provide a springy interface material between the head (25) of the pin and the thermal spreader (18). One of ordinary skill in the art would see that if the sponge material (36) is a thermal conductive material, it will enhance the heat dissipation of heat generating device (12) by

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forming an additional thermally conductive path between the head of the pin and the heat spreader (18). Attention is now directed to reference to Lamb for teaching of thermally conductive sponge material being both springy and thermally conductive using in a heat dissipation apparatus. Lamb discloses (figure 1 and column 2, lines 52-65) a heat dissipation apparatus having an interface material (120) disposed between a heat generating source (102) and a heat sink (130) wherein the interface material is made of a rubber sponge material which has a thermal conductivity of 0.5wat/(deg-K-meter) at 5 psi for the purpose of providing a thick compressible interface material and a good conduction heat path between the heat source and the heat sink. Since Chu and Lamb are both from the same field of endeavor, the purpose disclosed by Lamb would have been recognized in the pertinent art of Chu. It would have been obvious to one having ordinary skill in the art to make Chu's sponge material a thermal conductive sponge material as taught by Lamb for the purpose of providing a thick compressible interface material and a good conduction heat path between a heat source and a heat sink. Regarding claim 19, Chu and Lamb have disclosed all of the structural limitations of the invention. Therefore, it is believed that the combination of Chu and Lamb capable of performing the method for transferring thermal energy from a body to a heat sink as claimed, which includes all of the anticipated apparatus limitations.

Conclusion

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Tho Duong whose telephone number is (703) 305-0768. The examiner can normally be reached on from 9:30-6 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Bennet, can be reached on (703) 308-0101. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0861.



TD

April 9, 2004



Tho Duong

Patent Examiner.